

PUENTE BLANCO BRIDGE
(Bridge No. 381)
Barrio Palmas Neighborhood
Spanning the Mosquito Control Channel
Catano
Catano County
Puerto Rico

HAER No. PR-34

HAER
PR
25-CAT,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Southeast Region
National Park Service
Department of the Interior
Atlanta, Georgia 30303

HISTORIC AMERICAN ENGINEERING RECORD
PUENTE BLANCO BRIDGE (Bridge No. 381) HAER No. PR-34

HAER
PR
25-CAT,
1-

Location: PR-5, km. 4.53,
spanning the Mosquito Control Channel (Canal de la Malaria)
Barrio Palmas Neighborhood
Catano
Catano County
Puerto Rico
U.S.G.S. 7.5 minute Bayamon, Puerto Rico, quadrangle
Universal Transverse Mercator coordinates:
1323 II SW.802400.2040251

Date of Construction: 1943

Engineer: Unknown

Builder: U.S. Army

Present Owner: Puerto Rico Department of Transportation and Public Works

Present Use: Vehicular traffic

Significance: Puente Blanco is a skew, three-span, 15m.-long concrete slab bridge. The latter is a common bridge technology of the 1920s to 1940s, still used in small structures. This technology was judged as not technologically significant for inclusion in Puerto Rico's Historic Bridge Inventory, and this bridge thus was not considered. However, Puente Blanco was built to span a channel dug in the 1940s through a historically significant highway dating from 1853 for wetland drainage and disease control, related to a military build-up; it has art deco-style parapets, and was enough of a landmark in a naked landscape that it served to name an adjacent community. This structure has been judged as eligible for National Register listing by Puerto Rico's State Historic Preservation Office.

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(On behalf of the Puerto Rico Highway and Transportation Authority)

Date: June, 1997

A. SUMMARY

Bridge No. 381, known as "Puente Blanco" (Spanish for "White Bridge" because of the color of the paint used on it; see photo 6), carries PR-5, with vehicular traffic only, over the Mosquito Control Channel at kilometer 4.53.¹ It belongs to the Palmas ward (Barrio Palmas) of the municipality of Cataño. Cataño is located in the north coast of Puerto Rico, opposite to Old San Juan, just inside the entrance of San Juan Bay. The location plan (appendix) shows the location of Puente Blanco. It is owned by the Puerto Rico Highway and Transportation Authority.

Puente Blanco is located 3.5 kilometers southwest of the town center of Cataño. It was built in 1943 by the U.S. Army as part of its Mosquito Control Channel project. This channel was dug to drain swamplands whose natural drainage, the San Fernando Channel, had been blocked by the expansion works of Fort Buchanan. This condition had caused an increase in the number of mosquitoes and the risk of malaria.

The bridge was built for the crossing of the channel under the historic Bayamon-Cataño highway (see photo 5). It consists of a continuous reinforced concrete slab with three spans. Measuring 15 meters long by 8.60 meters wide, it stands on skew concrete abutments and wall-type piers, all supported by piles. Its parapets are ornamented with art deco style reliefs on both sides (see photos 10 and 11). It has suffered no significant alterations.

This bridge is not listed in the "Puerto Rico Historic Bridge Inventory Project", which dealt with highway and railroad bridges built on or before 1945. Bridge No. 381 was never considered individually for inclusion in the inventory because its concrete slab technology was categorized as "minor engineering", not embodying enough technological merit for listing as a "historic bridge". This criteria judgement was made by the blue-ribbon panel which set the inventory criteria, and was approved by the four agencies named above.²

There are, however, several elements which provide historic significance to Puente Blanco: its art deco elements; the fact that it was part of the Mosquito Control Channel project, which has been determined eligible to the National Register; the fact that it serves a historically important route, even if it was not an original feature of that route and the highway has lost most of its historic integrity; and the fact that it has been a landmark for over fifty years, to the point that the adjoining community of Puente Blanco took its name.

In this project, the bridge has been documented photographically and historically to archival standards at HABS/HAER's Level 3, as defined in the corresponding Memorandum of Agreement (see appendix). This bridge is to be removed, except for a parapet which will be integrated into a small park in the immediate vicinity, to make way to a wider bridge to facilitate traffic flow and to permit widening of the channel for flood control.

1 That kilometer numbering is the most widely used corresponding to route PR-5. When the highway belonged to route PR-167, between c.1948-1990, this location was posted as kilometer 27.9. In some recent documents it has appeared as kilometer 8.1. In 1938-39, the highway was identified as PR-24, PR Commissioner..., 1939.

2 Pumarada-O'Neill, *Los puentes...*, Appendix.

B. DESCRIPTION AND CONDITION OF THE BRIDGE

The bridge is 15 meters long (49.20 feet); its roadway is 8.60 meters (28.21 feet) wide. Its total width, measured to the faces of the piles' buttresses, is 10.92m. Its superstructure consists of a 34cm.-thick continuous reinforced concrete slab with three spans. The slab's clearance over the normal water level is 3.10m. The middle and south spans are 4.90 m. long, center to center, and the north span measures 5.20m. The piers and abutments are aligned 18 degrees, 43 minutes off the road's center line.

Its parapets are ornamented with art deco-style reliefs on both sides. The parapets have vertically-decorated 90cm.-wide posts at their ends and above each of the piles. In between, the parapets are decorated with horizontal receding concentric rectangles. The parapets are 1.23m.-high and 51cm.-thick, and have a 45cm.-high, 22cm.-thick inner base course (see photo 9).

The slab stands on skew concrete wall-type piers and abutments, all supported by piles. The piers have buttresses on both sides, rounded to the east (see photo 8) and triangular to the west (see photo 11). Each buttress is capped.

The channel banks and the bridge abutments are protected by concrete wing walls. These are decorated by irregular surface patterns on the mortar facing which suggest rubble masonry (see photo 12). They have varying lengths. Originally they seem to have been similar, but some have been extended up to retain higher banks, probably since the channel has been flanked with roads on three sides. These wing wall additions are in plain concrete and concrete block. They are the only alterations to the original bridge structure.

The bridge is structurally in good condition. However, the parapets, slab, piles, buttresses, and courses show evident signs of wear and have lost many corners and edges. There is at least one part of a pile, near the buttress, which has lost a small patch of its concrete protection.

C. HISTORICAL BACKGROUND *

An early sixteenth century trail called "Camino de Puerto Rico" linked the only two European settlements existing in the island at the time. It connected the original site of San German, located at that time near the mouth of the Añasco River, on the west coast, with Caparra, south of San Juan Bay. This trail followed the course of the aforementioned river east to the present site of San Sebastian, turning northward to the Arecibo region, and reaching Caparra after going through the Royal plantation of Toa, near the present site of Toa Alta. Most of this route traversed the northern slopes of the central mountain range, avoiding the broader rivers of the coastal plains. Its original bridges must have been pieces of timber laid across the mountain streams. After the capital village was moved from Caparra to the rocky, mosquito-free islet of San Juan, this road was complemented by an extension from Caparra to San Juan over two bridges built between 1519-23 over the San Antonio and Martin Peña channels. However, most trade with the Toa and Vega regions until the early 19th century took place by shallow-bottom vessels venturing across the entrance of San Juan Bay (using the dangerous passage between the capital and the mouth of the Bayamon River), and along the coast and the deeper sections of the Toa (Plata), Bayamon and Guaynabo rivers.⁴

After 2.5 centuries of being the economically stagnant site of a Spanish military outpost, Puerto Rico began to see some economic development in the second half of the eighteenth century. More towns were founded in that period than in the preceding centuries. Toa Alta was founded in 1751; Bayamon in 1772; and La Vega in 1776. La Vega split into Vega Alta and Vega Baja, east and west respectively, in 1794.⁵

Until 1842, the building of roads and highways had been left up to the initiative of municipalities and plantation owners. On that year, the Spanish government created the Commission of Roads and Channels, and a fund for the construction of roads with a lottery game to feed it.

By mid- nineteenth century, a few small, private railroads had been established to serve individual sugar plantations. The Spanish colonial government was trying, though unsuccessfully, to meet the rising demand for land transportation. Road and railway building plans were devised and a few stretches of paved road were actually started in the first part of the nineteenth century. As part of those efforts, in 1847 the government imposed a tax on livestock, letters, and local passports in order to raise funds. In that same year, the colonial governor ordered the construction of a wagon trail connecting Vega Baja to the highway just finished between San Juan and Rio Piedras. This initiative was the first major land transportation effort directed at the coastal plain west of San Juan. The following administration, however, decentralized planning and created adhoc road commissions at each district.

At the beginning of the second half of the century, partially encouraged by military considerations, a complete plan of first and second order highways was designed for the island. The population, numbering about half a million people, was concentrated along the coastal plains, while most of the western mountains were uninhabited.

This highway system was based on a first order highway encircling the island, and second order roads connecting it to the towns of the interior. The project began with the construction in 1853 of

3 Most of this section is based on Pumarada, *Los puentes...*

4 Badillo, p.18.

5 De la Rosa, *Vega Baja...*, 26.

the first order stretch between Cataño and Bayamon. A few years later, a new bridge was ordered built to substitute its original, wooden bridge. Imported from France in 1869, the De la Verna Bridge was Puerto Rico's first metal bridge.

An account of the roads serving Vega Alta in 1854 mentions a road from Vega Alta which met the highway to Cataño and Bayamon and the road between Dorado and Toa Alta.⁶ In addition, there were post facilities in the banks and mouths of the Cibuco⁷ and Plata rivers, as well as the Cerro Gordo cove in between, for the storage and transfer of cargo between river barges, carts, and coastal vessels.

The first order stretch of highway between Bayamon and Vega Baja was started in 1857. It required labor donations from the neighbors and townships of Bayamon, Toa Baja (located east of the Plata river), Toa Alta, Vega Alta, and Vega Baja. The segment between Bayamon and Vega Alta was finished in 1865. The Plata river crossing was done by means of a ferry. The shorter stretch between Vega Alta and Vega Baja was built between 1861 and 1863.⁸

Many events beneficial to land transportation between San Juan and the Western part of the island took place in 1881:⁹ the paving of the Cataño-Bayamon highway, the opening of the original Reyes Catolicos bridge over the Plata River between Dorado and Toa Alta, and the initiations of work at the Linea Ferrea del Oeste, a railroad set up between Bayamon and the San Juan waterfront warehouses with a rail-ferry connection across the bay from Cataño to San Juan.

The Linea Ferrea del Oeste laid its one-meter gage rails between Cataño and Bayamon along the highway and over the De la Verna Bridge. The ferry boat was equipped with rails, and the cars, pushed by small steam locomotives, rolled on and off as in modern container ships.

The Compañia Ferroviaria de Puerto Rico (CFPR) began rail service between San Juan and Arecibo through Bayamon, Dorado, Vega Alta and Vega Baja in 1891. Its line, however, only came close to Toa Baja and it never approached Cataño. In 1906, its rail service was extended through Mayagüez all the way to Ponce. The San Juan-Cataño-Bayamon rail-ferry line still prevailed for local traffic because of its significant distance advantage over the San Juan-Martin Peña-Bayamon route.

The CFPR railroad and the Linea Ferrea del Oeste were the only good land transportation links between San Juan and the Toa-Vega region. The equivalent highway service, which included unpaved segments and took a longer route, was impaired between 1899 and 1908 by the destruction of the Reyes Catolicos Bridge by a hurricane.

The first good highway connection from San Juan to the west was completed in 1915 by the erection of a bridge over the mouth of the Caño Martin Peña for a highway linking Bayamon and San Juan following the outline of the bay. Eventually, this put the ferry transportation of cargo between San Juan and Cataño out of business, but the passengers still prefer the water route. Since the late 1930s, the Cataño-Bayamon highway lost its rails as well as its islandwide importance. It has been since just a link between a city and a town.

6 Santana-Rabell, *Op. Cit.*, 94.

7 San Miguel, *El mundo...*, 28; De la Rosa, *Op. Cit.*, 40; Martinez-Vergne, *Capitalism...*, 44.

8 Santana-Rabell, *Op. Cit.*, 129-132.

9 *R.O.P.*, "Obras...", 161.

CATAÑO

Cataño was founded in mid-nineteenth century as a safer alternative to Palo Seco for crossing the mouth of San Juan Bay. The village of Palo Seco had developed as a port for the passage between San Juan and the region southwest of the bay. Palo Seco is located on an elongated mound over the northern margin of the historic mouth of the Bayamon river, at the entrance to San Juan Bay.

Crossing the bay between San Juan and Palo Seco presented serious difficulties because of river bars and currents, and also because of strong bay currents. The ships that navigated the rivers of Toa Baja, Rio Piedras, Bayamon, and Guaynabo stopped at Palo Seco, be it to unload or transfer their cargo, or to prepare for the dangerous crossing of the bay. Palo Seco was made an independent municipality in 1839. However, it was suppressed as a municipality in 1845. This was done as a result of the first Puerto Rico transportation plan of 1842. This plan included moving the bay passage from Palo Seco to the point of Cataño, which uninhabited at the time, and building a highway between Cataño and Bayamon. The highway had to cross a swamp and required a bridge over the Bayamon river. The new port was to be located in the small, mangrove-clogged cove south of the Point of Cataño, at the mouth of the San Fernando Channel.

By 1847, the thick mangrove which covered the cove had been destroyed to allow its use as a port. Nonetheless, the highway project was suspended in 1850 due to lack of funds. The newly formed Cataño Steam Company, however, succeeded in lifting this suspension by promising the Highway Board to pay part of the cost of the highway. This firm, acting on the announced transportation plans, had ordered a steam boat, which was currently being built in Philadelphia. The coast of Cataño was the only site deep enough for this steam boat at the southwest margin of San Juan Bay. Before the highway project was resumed, the island's governor asked for a report on less costly alternatives to the proposed route and bridge. The Board's engineer suggested the present highway route to make better use of the existing solid ground. He also recommended setting up a ferry in Palo Seco to serve the traditional land route from the Toa and Vegas for bringing its passengers and cargo into Cataño. A future highway from Cataño to Vega Alta was also being contemplated at the time, going through Bayamon and the centers of the intermediate towns. The population of Palo Seco opposed the construction of such a highway, fearing that it would lead to its decadence. The municipality of Toa Baja, which included Palo Seco, also opposed this highway. In 1853, steam boat service was finally established between San Juan and Cataño, simultaneous with the opening of the Bayamon-Cataño highway and a wooden bridge over the Bayamon River.

Prior to that event, the point of Cataño was inhabited only by a few small merchants who used the port opened in 1847 to ship and sell farm produce in San Juan. Its population increased rapidly after 1853, fed by families moving in from Bayamon and Palo Seco. In the last third of the nineteenth century, Cataño became a prosperous village. In 1873, the governor authorized more mangroves to be destroyed and dredged at the mouth of the San Fernando Channel to allow the expansion of its port.

Until the 1880s, most of the transportation between Cataño and San Juan and between Cataño and Bayamon mainly employed small vessels. These same vessels provided communication and transportation by river and along the coast between Bayamon, Toa Baja, Dorado, Vega Alta, Toa Alta, and Guaynabo. At the end of 1882, the Linea Ferrea del Oeste became the first reliable transportation system between San Juan, Bayamon, and Cataño. The line's two iron-clad steam boats could accomodate four railroad cars, serving cargo and passengers on first and second class. These passengers paid 2 and 3 cents respectively. Since 1882, drinking water was brought to Cataño from Bayamon in cisterns on board the railroad cars.

In 1920, Cataño counted with five important private enterprises: a tobacco warehouse and destemming works, a fruit warehouse and packaging firm, a lumber yard, a gas refinery, and a dry dock which still exists.

In 1921, Bull Insular Lines bought Linea Ferrea del Oeste, and continued operating the ferryboats from the San Fernando Channel. A subsequent price hike led to the formation of the Popular Transport Company. The latter raised capital through the sale of stock for \$1.00 each. This company erected a dock on the north shore of the point, closer to San Juan. It also obtained a franchise to operate buses between Bayamon and Cataño. As a consequence of this and of the competition offered by the main railroad, Linea Ferrea del Oeste closed down in 1927. In 1960, the Port Authority of Puerto Rico expropriated the Compania Popular operation and its port facilities, and continues operating a passenger ferry until present.

In April 25, 1927, Cataño was declared a municipality. The rural area is constituted only by a single ward, Barrio Palmas.

During the 1940s, people from rural areas began to move into the scant solid ground between Cataño and Bayamon. This led to the growth of the Cucharillas, Juana Matos, and Puente Blanco communities. This movement was part of the period's massive migration from rural areas to San Juan seeking defense and industrial jobs. Emilio Matos is considered to be the founder of the Puente Blanco community, having been the first person to build a house in this area.

Cataño's present population is approximately 32,000 inhabitants. It encompasses 5.071 square miles, which makes it the smallest municipality in the island. It is located at the western margin of the San Juan Bay, and comprises low, flat, lands with a high phreatic level. The water-borne passenger service between San Juan and Cataño continues to be of great importance. Although basically an industrial city, Cataño's fishing port is one of the island's busiest.

CONCRETE IN PUERTO RICO'S BRIDGES

Concrete had been in use in Puerto Rico in the late nineteenth century, but its use in bridges had been mostly limited to foundations because of its relatively high price. Cement was then imported in barrels from Northern Europe. US sovereignty allowed the tax-free importation of American cement at the precise point in time in which reinforced concrete technology was coming of age. The first decade of the present century saw several significant concrete bridges built in Puerto Rico.

Concrete arch bridges were the first Puerto Rican applications of U.S. bridge technology, and provided the first documented use of concrete in bridge superstructures in Puerto Rico. During the 1910s, concrete became the standard bridge substructure and deck material. By 1918 it was being used in short-span girder bridges, while its arches were displacing steel pony trusses in mid-size spans.

In concrete beam bridges, the main girders run longitudinally under a concrete deck and support it directly. In concrete slab bridges, a thicker, uniform deck is reinforced longitudinally, becoming a wide beam that supports itself and its loads. It is used for shorter spans, generally over a series of piers. Concrete slabs are cast continuously over their supports, with spans usually between 6 and 8 meters. Many concrete beam and slab bridges up to the 1930s had some architectural detailing, usually at the tops of the piers and the railings.

Concrete slabs were typically used for multispan structures in locations where pier construction was not expensive, especially when clearance problems existed. Concrete slab bridges are still common in most parts of Puerto Rico. The majority dates mostly from the 1930s to 1940s. Many

of them have widths that are acceptable for secondary roads, and thus are not slated for replacement. As concrete is fairly durable in mild climates, even the few abandoned slab bridges are rather well-preserved. Many of them, especially the older structures, have some architectural details, usually balustrades and pier mouldings.

THE MOSQUITO CONTROL CHANNEL

The Mosquito Control Channel, locally known as Canal de la Malaria, was dug by the U.S. Army in 1943-44 in order to counteract a malaria problem created by the obstruction of the San Fernando Channel, resulting from the hydraulic filling operations carried out by the military during the World War II expansion of Fort Buchanan. At the time it was built, there was no development or inhabitants in the area except for the WKAQ radio antenna, the highway, and a few houses and stores along the latter.

The Channel begins about .5 km. northwest of Fort Buchanan and discharges on San Juan Bay next to the Bay View residential area, with an approximate length of 3.3 kilometers. The San Fernando Channel was the natural drainage of the area corresponding to the western part of the fort and the adjoining area

According to the Puerto Rico State Historic Preservation Officer, the Mosquito Control Channel, Bridge No. 381, Bridge No. 371 at PR-888, and the pumping station near the mouth of the channel at San Juan Bay, are considered a part of the unit eligible to the National Register of Historic Places. The channel presently belongs to the Puerto Rico Natural Resources Department, which maintains and monitors it and operates a pump house on its mouth.

PUENTE BLANCO (Bridge No. 381)

No record has been found of the actual builder of Puente Blanco. The older persons in the community identify the U.S. Army Corps of Engineers as the builder. However, neither the Puerto Rico nor the Jacksonville Regional offices of the Corps have any records on the construction of the bridge. There are no records of the construction of the bridge in the yearly Reports of the Puerto Rico Commissioner of the Interior, which list all public works done by the island's government. The reports reviewed, 1942-48, have no record either of a transfer of the bridge to the island's government by the U.S. military.

Jacksonville says that many small engineering projects done during the war were done by the U.S. Army directly, and not by its Corps of Engineers. However, the Fort Buchanan Engineering and Real Estate offices have no records either. Within the grounds of Fort Buchanan there is at least one slab bridge with parapets, but the latter have no ornamentation of any kind. We have concluded that: the bridge was not built by the government of Puerto Rico; it was not transferred to the island government because, since it was built on an existing island road, such a transfer was not deemed necessary; it was built either by the U.S. Army Corps of Engineers or by U.S. Army engineers. We have identified the builder just as "U.S. Army" because this military unit includes the Corps of Engineers.

This bridge is not listed in the "Puerto Rico Historic Bridge Inventory Project", which dealt with highway and railroad bridges built on or before 1945. This inventory, conducted between 1989 and 1992, was sponsored by the Puerto Rico Highway and Transportation Authority and the Federal Highway Administration. The Institute of Puerto Rican Culture and the State Historic

Preservation Office of Puerto Rico participated in the selection of criteria, and in bridge evaluation and selection. Puente Blanco was never considered individually for inclusion in the inventory because its concrete slab technology was categorized as "minor engineering", not embodying enough technological merit for listing as a "historic bridge". This criteria judgement was made by the blue-ribbon panel which set the inventory criteria, and was approved by the four agencies named above.¹⁰ The panel and the agencies did consider and include a few "minor engineering bridges" because of their exceptional landmark or architectural value, or as representative examples of "minor engineering" technologies. Bridge No. 381 was not considered under any of these exceptions.

However, there are several elements which provide historic significance to Puente Blanco: its architectural art deco elements; the fact that it was part of the Mosquito Control Channel project, which has been determined eligible to the National Register by the Puerto Rico State Preservation Officer; the fact that it serves a historically important route, even though was not an original feature of that route and that the latter has lost most of its historic integrity; and the fact that it has been a landmark in the route for over fifty years, to the point that the adjoining community of Puente Blanco took its name.

10 Pumarada-O'Neill, *Los puentes...*, Appendix.

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